



09, 917, 535

IFW

Attorney Docket No.:10001215-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

I hereby certify that this transmittal of the below described document is being deposited with the United States Postal Service in an envelope bearing First Class Postage and addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the below date of deposit.					
Date of Deposit:	03/24/05	Name of Person Making the Deposit:	Shay Torregano	Signature of the Person Making the Deposit:	<i>Shay Torregano</i>

Patent No.: US 6,845,501 B2

Issued: JANUARY 18, 2005

Name of Patentee: Carol L. THOMPSON, Michael L. ZIEGLER, Jerome C. HUCK, Lawrence D.K.B. DWYER

Title of Invention: METHOD AND APPARATUS FOR ENABLING A COMPILER TO REDUCE CACHE MISSES BY PERFORMING PRE-FETCHES IN THE EVENT OF CONTEXT SWITCH

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450Attention: Decision and Certificate of Correction
Branch of the Patent Issue Division

Sir:

**REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT FOR
PTO MISTAKE (37 CFR §1.322(a))**

1. Attached, in duplicate, is PTO/SB/44 (also Form PTO-1050), with at least one copy being suitable for printing.
2. The exact page and line number where the errors are shown correctly in the application file are:

- ☒ Transmittal accompanied with filing of Patent Application
- ☒ Declaration/Power of Attorney form submitted with filing of Patent Application

3. Please send the Certificate to:

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400*(complete, if applicable)*_____
Signature(s) of patentee(s)

or

(type or print name of assignee)

Signature of assignee or person authorized to
sign on behalf of assignee

☒ Assignment recorded on

01/02/2002

(type or print name of authorized person signing)

Reel 012426

Frame 0810

Title of authorized person signing

☐ Recordal of assignment attached

☐ Attached is a "STATEMENT UNDER 37 CFR 3.73(b)," establishing the right of
the assignee to action in this case.

Please direct all correspondence concerning the above-identified application to the
following address:

HEWLETT-PACKARD COMPANY
INTELLECTUAL PROPERTY ADMINISTRATION
P.O. BOX 272400
FORT COLLINS, COLORADO 80527-2400

Respectfully submitted,

Date:

3/24/05

By:



John P. Wagner, Jr.
Reg. No.: 35,398

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO: US 6,845,501 B2

DATED: JANUARY 18, 2005

INVENTOR(S): Carol L. THOMPSON, Michael L. ZIEGLER, Jerome C. HUCK,
Lawrence D.K.B. DWYER

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

(75) Inventors: **Carol L. Thompson**, San Jose, CA
(US); **Michael L. Ziegler**, Campbell,
CA (US); **Jerome C. Huck**, Palo Alto,
CA (US); **Lawrence D. K. B. Dwyer**,
South San Francisco, CA (US)

MAILING ADDRESS OF SENDER:
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PATENT NO: US 6,845,501 B2

No. of additional copies: 1

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P. O. Box 272400
Fort Collins, Colorado 80527-2400



PATENT APPLICATION
ATTORNEY DOCKET NO. HP 10001215

IN THE U.S. PATENT AND TRADEMARK OFFICE
Patent Application Transmittal Letter

COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) is a(n): ☒ Utility ☐ Design

☒ original patent application,
☐ continuation-in-part application

INVENTOR(S): **Thompson et al.**

TITLE: **A METHOD AND APPARATUS FOR ENABLING A COMPILER TO REDUCE CACHE MISSES BY PERFORMING PRE-FETCHES IN THE EVENT OF A CONTEXT SWITCH**

Enclosed are:

☒ The Declaration and Power of Attorney. ☐ signed ☒ unsigned or partially signed
☒ 3 sheets of drawings (one set) ☐ Associate Power of Attorney
☐ Form PTO-1449 ☐ Information Disclosure Statement and Form PTO-1449
☐ Priority document(s) ☐ (Other) _____ (fee \$ _____)

CLAIMS AS FILED BY OTHER THAN A SMALL ENTITY				
(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) TOTALS
TOTAL CLAIMS	20 — 20	0	X \$18	\$ 0
INDEPENDENT CLAIMS	3 — 3	0	X \$80	\$ 0
ANY MULTIPLE DEPENDENT CLAIMS	0		\$270	\$ 0
BASIC FEE: Design (\$320.00); Utility (\$710.00)				\$ 710
TOTAL FILING FEE				\$ 710
OTHER FEES				\$
TOTAL CHARGES TO DEPOSIT ACCOUNT				\$ 710

Charge \$ 710 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16, 1.17, 1.19, 1.20 and 1.21. A duplicate copy of this sheet is enclosed.

* Express Mail® label no. EL 789318539 US

Date of Deposit July 27 2001

I hereby certify that this is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: Commissioner for Patents, Washington, D.C. 20231.

By

Typed Name: Julie Campbell

Respectfully submitted,

Thompson et al.

By

Scott A. Horstemeyer
Scott A. Horstemeyer

Attorney/Agent for Applicant(s)
Reg. No. **34,183**

Date: **July 27, 2001**

5 **A METHOD AND APPARATUS FOR ENABLING A COMPILER
TO REDUCE CACHE MISSES BY PERFORMING PRE-FETCHES
IN THE EVENT OF A CONTEXT SWITCH**

TECHNICAL FIELD OF THE INVENTION

10 The present invention relates to compilers and, more particularly, to a compiler that generates pre-fetches that are performed in the event of context switch wherein the compiler returns from the context switch within a specified code region in cache memory to reduce cache misses.

15 **BACKGROUND OF THE INVENTION**

 In a computer system that is multi-threaded or multi-programmed, and that utilizes cache memory, upon each context switch made by the operating system, one thread or process is swapped out of cache and another is swapped into cache. When
20 this occurs, the cache is generally re-populated only as the new thread or process references its data. Thus, after such a context switch, the new thread or process generally incurs a high frequency of cache misses.

 Furthermore, in a computer system that supports multiple outstanding cache misses, but which stalls on the first use of data being loaded, re-populating cache only
25 as a new thread or process references its data may result in ineffectual use of all available bandwidth.

SUMMARY OF THE INVENTION

 Accordingly, a need exists for a method and apparatus that enable the number
30 of cache misses that typically occur in the event a context switch to be reduced or eliminated, thus enabling the bandwidth of the computer system to be efficiently utilized. The apparatus of the present invention comprises at least first logic, second logic and third logic that perform certain functions that enable cache misses to be reduced or eliminated. The first logic identifies at least a first prefetch region in a
35 first memory element during compilation of a computer program by the computer. The second logic identifies critical memory references within the first prefetch region during compilation. The critical memory references within the first prefetch region correspond to data that may be needed in cache memory if a context switch occurs from a process or thread associated with the second context to a process or thread

**DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION**

ATTORNEY DOCKET NO. HP 10001215

As a below named inventor, I hereby declare that
My residence/post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**A METHOD AND APPARATUS FOR ENABLING A COMPILER TO REDUCE CACHE MISSES BY
PERFORMING PRE-FETCHES IN THE EVENT OF A CONTEXT SWITCH**

the specification of which is attached hereto unless the following box is checked:

☒ was filed on 07/27/01 as US Application Serial No. or PCT International Application Number 09/917,535 and was amended on _____ (if applicable).

I hereby state that I have reviewed and understood the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR 1.56.

Foreign Application(s) and/or Claim of Foreign Priority

I hereby claim foreign priority benefits under Title 35, United States Code Section 119 of any foreign application(s) for patent or inventor(s) certificate listed below and have also identified below any foreign application for patent or inventor(s) certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE FILED	PRIORITY CLAIMED UNDER 35 U.S.C. 119
			YES: _____ NO: _____
			YES: _____ NO: _____

Provisional Application

I hereby claim the benefit under Title 35, United States Code Section 119(e) of any United States provisional application(s) listed below:

APPLICATION SERIAL NUMBER	FILING DATE

U. S. Priority Claim

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

APPLICATION SERIAL NUMBER	FILING DATE	STATUS (patented/pending/abandoned)

POWER OF ATTORNEY:

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

Customer Number 022879

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Number Bar Code
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Send Correspondence to:
HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

Direct Telephone Calls To:

Tuan V. Ngo
~~Phong B. Smith~~
(408) 447-~~8854~~ 8133

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Inventor: Carol L. Thompson Citizenship: United States

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Post Office Address: N/A

Carol L. Thompson
Inventor's Signature

7/3/01
Date

DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION (continued)

ATTORNEY CASE NO. HP 10001215

Full Name of # 2 joint inventor: Michael L. Ziegler Citizenship: United States

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Full Name of # 4 joint inventor: Lawrence D.K.B. Dwyer Citizenship: United States

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Inventor's Signature: [Signature] Date: 8/14/01

Full Name of # 5 joint inventor: _____ Citizenship: _____

Residence: _____

Post Office Address: _____

Inventor's Signature: _____ Date: _____

Full Name of # 6 joint inventor: _____ Citizenship: _____

Residence: _____

Post Office Address: _____

Inventor's Signature: _____ Date: _____

Full Name of # 7 joint inventor: _____ Citizenship: _____

Residence: _____

Post Office Address: _____

Inventor's Signature: _____ Date: _____

Full Name of # 8 joint inventor: _____ Citizenship: _____

Residence: _____

Post Office Address: _____

Inventor's Signature: _____ Date: _____